



## **NASA STTR 2007 Phase I Solicitation**

### **T7 Aerospace and Atmospheric Research for Improving Quality of Life**

To accomplish the Agency's goals and objectives in atmospheric research new innovations are required in the areas of optical detectors arrays for lidar and passive remote sensing and fabrication techniques for high temperature composites. This STTR Topic will deliver validated technology, scientific knowledge, and understanding of the Earth's atmosphere.

## **Subtopics**

### **T7.01 Optical Detector Arrays with Unusual Geometrical Shapes for Lidar and Passive Remote Sensing Applications**

**Lead Center: LaRC**

Innovative or improved concepts are solicited for the development of detectors and detector arrays formed into unusual shapes. Of immediate interest are detector formats with cylindrical symmetry, where the detecting surface is on the curved portion of a cylinder and extends entirely (or nearly entirely) around the circumference of the cylinder. The detecting element need not be continuous, but could be a series of discrete elements. The ultimate goal of this solicitation is the development and production of a stacked array of cylindrical detecting elements.

NASA has interest in developing PV or PC IR detector arrays, but is especially interested in the development of visible/NIR photon-counting detectors constructed in a stacked cylindrical format. The stacked arrays should be sensitive across a broad spectral range. If cooling is required, the contact point to the cooler must be at one end of the array stack.

Arrays eventually employed will have a small size (cylindrical diameter ~ 1 centimeter or less, total length ~ 2-5 centimeters) and a moderately large number of axial elements (~ 32-128.) Fill factor of the array should be optimized to have as little non-detector surface area as possible. Electronics required to read the devices should

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also be developed as part of the project unless these are readily obtainable elsewhere.

Ultimately these detectors will be used as part of novel lidar systems and passive IR/visible spectrometers.

Proposals should describe the expected sensitivities/efficiencies of the proposed devices in terms of signal levels and wavelength dependencies. Limitations on the eventual size and power requirements of fully developed devices should be indicated in the proposal along with a discussion of any potential environmental constraints on their operation.

## **T7.02 Innovative Fabrication Techniques for High Temperature Composites**

**Lead Center: LaRC**

Innovative concepts are being solicited for the development of fabrication techniques for high temperature composites capable of operating within the range of 350°F for at least 50,000 hours to 600°F for 1000 hours. The highest priority is structural materials that are capable of being used at the above temperature regimes for aerospace applications. Emphasis is focused on cost effective and highly automated high temperature composite manufacturing concepts. Composite processing techniques that do not require autoclave processing are of key importance. Fabrication techniques include resin infusion (VARTM, RTM), tow/tape placement, e-beam curing and other non-autoclave processing techniques. Innovative and novel composite fabrication approaches are sought for the following materials and structural systems:

- Polymer matrix composites;
- Fiber metal laminates;
- Hybrid composites;
- Thermal protection and insulation systems;
- Complex composite and hybrid structural systems; and
- Low-density and high-temperature materials.

Proposals should address the following performance metrics as appropriate:

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- Processing techniques of lightweight, high temperature composites;
  - Resin development;
  - Reinforcement development;
  - Out of Autoclave fabrication technologies;
  - Aerospace quality structural application;
  - Characterization of material properties;
  - Elevated use temperature capability;
  - Damage tolerance;
  - Solvent resistance;
  - Long term durability;
  - Scalability.